STANDARD SPECIFICATIONS FOR PRESSURE WATER FILTERS[1]

RATES OF FILTRATION

Rates of filtration are based upon the "Report of Committee on Recommended Standardization of Filters" of the American Society of Mechanical Engineers, presented at the annual meeting of the A.S.M.E. December, 1916. This report fixes the rate of filtration for potable water as follows:

"Whenever the water is to be used for domestic purposes or to secure full bacterial purification, the capacity shall be based on a rate of filtration not to exceed 2 gals. per minute per square foot of filtering area and a coagulant must be used."

A full report of the committee is contained in Transactions of A.S.M.E. for 1917, pages 425–432.

Rates of filtration for various uses should conform to the following schedule:

2 gals. per sq. ft. per minute for all supplies used for drinking, or for the preparation of food products.

2 to 4 gals. per sq. ft. per minute when filtering a treated municipal supply of approved bacterial purity.

2 to 4 gals. per sq. ft. per minute for swimming pools, and for all industrial uses.

2 to 5 gals. per sq. ft. per minute as conditions may warrant for double filtration, using sand followed by charcoal where reduction of color, odor, taste or certain forms of iron is desired. This method of filtration not to be applied for bacterial purification.

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[1] Adopted by Associated Manufacturers of Water Purifying Equipment.

Capacities of filters for rates of 2, 3 and 4 gallons per square foot per minute

DIAMETER		LENGTH	AREA	CAPACITIES PER MIN.			PIPE CONNECTIONS		MIN. WASH WATER AT 12 GALS. PER SQ. FT. PER MIN.
				2 gals. per sq. ft.	3 gals. per sq. ft.	4 gals. per sq. ft.	Inlet outlet filter wash	Waste to sewer	
Vertical filters									
ft.	*in.*	*ft.*	*sq. ft.*	*gals.*	*gals.*	*gals.*	*in.*	*in.*	*gals.*
1	0		0.785	1.57	2.35	3.14	$\frac{3}{4}$	1	9.42
1	2		1.06	2.12	3.18	4.24	1	$1\frac{1}{4}$	12.72
1	4		1.39	2.78	4.17	5.56	1	$1\frac{1}{4}$	16.68
1	8		2.18	4.36	6.54	8.72	$1\frac{1}{4}$	$1\frac{1}{2}$	26.16
2	0		3.14	6.28	9.42	12.5	$1\frac{1}{2}$	2	37
2	6		4.90	9.8	14.7	19.6	$1\frac{1}{2}$	2	60
3	0		7.06	14.1	21.1	28.2	2	$2\frac{1}{2}$	84
3	6		9.62	19.2	28.8	38.5	2	$2\frac{1}{2}$	115
4	0		12.56	25.1	37.6	50.2	$2\frac{1}{2}$	3	150
4	6		15.90	31.8	47.7	63.6	$2\frac{1}{2}$	3	190
5	0		19.63	39.2	58.8	78.5	3	4	235
6	0		28.27	56.5	84.8	113.1	4	5	339
7	0		38.48	76.9	115.4	153.9	4	5	460
8	0		50.27	100.5	150.8	201.1	5	6	600
Horizontal filters									
8	0	10	68.5	137	205.5	274.0	6	8	822
8	0	12	83.4	166.8	250.2	333.6	6	8	1000
8	0	14	98.2	196.4	294.6	392.8	6	8	1178
8	0	16	113.1	226.2	339.3	452.4	8	10	1357
8	0	20	142.7	285.4	428.1	570.8	8	10	1712
8	0	25	179.8	359.6	539.4	719.2	8	10	2157

Length is over-all length of filter, and area of bed is calculated for surface of bed 18 in. above center of shell.

Area of segments of the 2 dished heads = 9.2 sq. ft.

Area per lineal foot of bed in the cylinder = 7.42 sq. ft.

Example: 8x16 ft. filter—Area in heads = 9.2 sq. ft.

Area in cylinder, 14x7.42 = 103.9 sq. ft.

Total effective area = 113.1 sq. ft.

Construction of vertical steel pressure filters

DIAMETER	WORKING PRESSURE								
	65 lbs. per sq. in.			100 lbs. per sq. in.			125 lbs. per sq. in.		
	Shell		Head	Shell		Head	Shell		Head
	Min. joint eff.	Thickness	Thickness	Min. joint eff.	Thickness	Thickness	Min. joint eff.	Thickness	Thickness
in.	*per cent*	*in.*	*in.*	*per cent*	*in.*	*in.*	*per cent*	*in.*	*in.*
24	50	$\frac{3}{16}$	$\frac{1}{4}$	50	$\frac{3}{16}$	$\frac{1}{4}$	50	$\frac{1}{4}$	$\frac{5}{16}$
30	50	$\frac{3}{16}$	$\frac{1}{4}$	57	$\frac{1}{4}$	$\frac{5}{16}$	50	$\frac{5}{16}$	$\frac{5}{16}$
36	50	$\frac{3}{16}$	$\frac{1}{4}$	57	$\frac{1}{4}$	$\frac{5}{16}$	70	$\frac{1}{4}$	$\frac{3}{8}$
42	57	$\frac{1}{4}$	$\frac{5}{16}$	70	$\frac{1}{4}$	$\frac{3}{8}$	70	$\frac{5}{16}$	$\frac{7}{16}$
48	57	$\frac{1}{4}$	$\frac{5}{16}$	70	$\frac{1}{4}$	$\frac{3}{8}$	70	$\frac{5}{16}$	$\frac{7}{16}$
54	57	$\frac{1}{4}$	$\frac{5}{16}$	70	$\frac{5}{16}$	$\frac{7}{16}$	70	$\frac{3}{8}$	$\frac{1}{2}$
60	57	$\frac{1}{4}$	$\frac{3}{8}$	70	$\frac{5}{16}$	$\frac{7}{16}$	67	$\frac{7}{16}$	$\frac{1}{2}$
72	72	$\frac{1}{4}$	$\frac{3}{8}$	69	$\frac{3}{8}$	$\frac{1}{2}$	66	$\frac{1}{2}$	$\frac{9}{16}$
84	70	$\frac{5}{16}$	$\frac{7}{16}$	66	$\frac{1}{2}$	$\frac{9}{16}$	66	$\frac{9}{16}$	$\frac{11}{16}$
96	69	$\frac{3}{8}$	$\frac{7}{16}$	68	$\frac{1}{2}$	$\frac{5}{8}$	68	$\frac{5}{8}$	$\frac{3}{4}$

Standard manholes 11x15 in. or 10x16 in.

Tensile strength of steel plate 55,000 to 65,000 lbs. per sq. in.

Heads dished to radius of diameter of tank.

Hydrostatic test 50 per cent in excess of working pressure.

Construction of cast iron pressure filters

DIAMETER	WORKING PRESSURE			
	65 lbs. per sq. in.		100 lbs. per sq. in.	
	Shell thickness	Head and flange thickness	Shell thickness	Head and flange thickness
in.	*in.*	*in.*	*in.*	*in.*
12	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{7}{8}$
14	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{11}{16}$	$\frac{15}{16}$
16	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{11}{16}$	$\frac{15}{16}$
20	$\frac{11}{16}$	$\frac{15}{16}$	$\frac{3}{4}$	1
24	$\frac{11}{16}$	$\frac{15}{16}$	$\frac{13}{16}$	$1\frac{1}{16}$
30	$\frac{3}{4}$	1	$\frac{7}{8}$	$1\frac{1}{8}$
36	$\frac{13}{16}$	$1\frac{1}{16}$	$\frac{15}{16}$	$1\frac{3}{16}$
42	$\frac{13}{16}$	$1\frac{1}{16}$	1	$1\frac{1}{4}$
48	$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{16}$	$1\frac{5}{16}$

Filters to be gray iron castings having a tensile strength of approximately 20,000 lbs. per sq. in.

Hydrostatic test 50 per cent in excess of working pressure to be applied.

Heads dished to radius equal to diameter of shell may be modified with rib reinforcement to same thickness as shell.

Variations of $\frac{1}{8}$ in. in these thicknesses of shells and heads and flanges to be permissible.